

ENGINE DATASHEET



1106D-E70TAG Electric Power Engines

Power range 1500 rpm 136-189 kW (engine gross power)

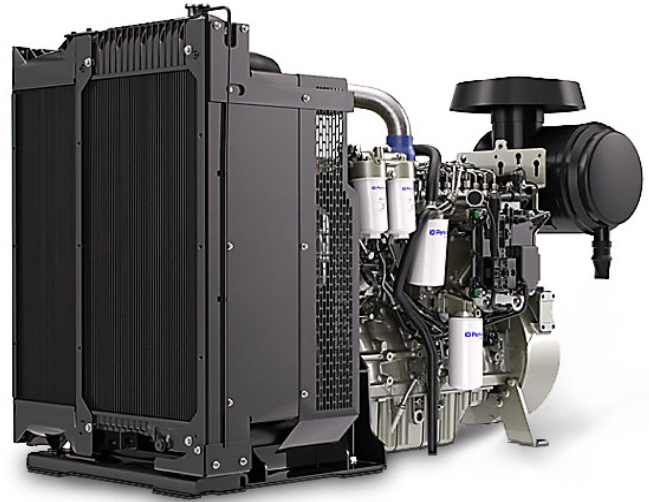
Power range 1800 rpm 156-235 kW (engine gross power)

Emissions EU Stage IIIA/U.S. EPA Tier 3/China Nonroad Stage III

Building upon Perkins proven reputation within the power generation industry, the 1106D Series range of Electropak engines now fit even closer to customers' needs.

In the world of power generation success is only gained by providing more for less. With the 1106D products, Perkins has engineered even higher levels of reliability, yet lowered the cost of ownership.

1100D engines are assembled around optimal, efficient manufacturing processes with state-of-the-art technology. They are built to provide the ideal power solution for customers who sell their applications into lesser regulated countries.



Features and benefits

- The Perkins® 1106D-E70TAG engines provide **greater productivity** through an improved power to weight ratio and have been designed for excellent load acceptance so your facility is powered quickly in all conditions.
- The 1106D high power density has been achieved in a 7 litre engine, using an electronic fuel injector system, making this engine robust for all markets which has the ability to cope with the variation of fuel qualities around the world delivering **high quality as standard**.
- Service intervals are set at 500 hours as standard assuming approved fuels and lubricating oils are used to deliver **low operating costs**.
- Through an experienced global network of distributors and dealers, fully trained engine experts deliver total service support around the clock, 365 days a year. They have a comprehensive suite of web based tools at their finger tips, covering technical information, parts identification and ordering systems, all dedicated to **maximising the productivity** of your engine.
Perkins actively pursues product support excellence with our distribution network investing in their territory to provide you with a consistent quality of support across the globe.
- Throughout the entire life of a Perkins engine, we provide access to genuine factory specification parts giving reassurance that you receive excellent quality for the **lowest possible cost**, wherever your Perkins powered machine is operating in the world.

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Specification

| | Model | | | |
|-------------------------------------------------|------------------------------------|---------------|---------------|---------------|
| | 1106D-E70TAG2 | 1106D-E70TAG3 | 1106D-E70TAG4 | 1106D-E70TAG5 |
| Configuration | ElectropaK | | | |
| Cylinders | 6 vertical in-line | | | |
| Displacement, litres (in ³) | 7.01 (428) | | | |
| Aspiration | Turbocharged aftercooled | | | |
| Bore and stroke, mm (in) | 105 x 135 (4.1 x 5.3) | | | |
| Combustion system | Direct injection | | | |
| Compression ratio | 16.8:1 | | | |
| Exhaust aftertreatment | N/A | | | |
| Rotation (viewed from flywheel) | Anti-clockwise, viewed on flywheel | | | |
| Total lubricating oil capacity, litres (US gal) | 16.5 (4.4) | | | |
| Cooling system | Liquid | | | |
| Total coolant capacity, litres (US gal) | 21 (5.5) | | | |

Technical information

| Model | Speed | Type of Operation | Engine Power | | Typical Generator Output* (Net) | | Prime Fuel Consumption | | | |
|---------------|-------|-------------------|--------------|-----------|---------------------------------|-----|------------------------|-------|-------|-------|
| | | | Gross | Net | | | 110% | 100% | 75% | 50% |
| | rpm | | kW (hp) | kW (hp) | kVA | kWe | g/kWh | g/kWh | g/kWh | g/kWh |
| 1106D-E70TAG2 | 1500 | Prime | 136 (182) | 129 (173) | 123 | 114 | 213 | 217 | 230 | 234 |
| | | Standby | 149 (200) | 143 (192) | 135 | 126 | | | | |
| | 1800 | Prime | 156 (209) | 145 (194) | 162 | 130 | 212 | 215 | 231 | 240 |
| | | Standby | 171 (229) | 161 (216) | 178 | 143 | | | | |
| 1106D-E70TAG3 | 1500 | Prime | 148 (198) | 141 (189) | 136 | 125 | 210 | 212 | 223 | 229 |
| | | Standby | 163 (219) | 156 (209) | 150 | 138 | | | | |
| | 1800 | Prime | 167 (224) | 157 (211) | 174 | 139 | 209 | 212 | 232 | 239 |
| | | Standby | 184 (247) | 173 (232) | 191 | 153 | | | | |
| 1106D-E70TAG4 | 1500 | Prime | 172 (231) | 165 (221) | 180 | 144 | 210 | 211 | 221 | 235 |
| | | Standby | 189 (253) | 182 (244) | 200 | 160 | | | | |
| | 1800 | Prime | 190 (255) | 180 (241) | 200 | 160 | 208 | 212 | 227 | 233 |
| | | Standby | 209 (280) | 199 (267) | 219 | 175 | | | | |
| 1106D-E70TAG5 | 1800 | Prime | 212 (284) | 203 (272) | 227 | 182 | 210 | 215 | 229 | 233 |
| | | Standby | 235 (315) | 224 (300) | 250 | 200 | | | | |

*Generator powers are typical and based on typical alternator efficiencies and a power factor (cos θ) or 0.8.

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Standard equipment

| | Model | | | |
|--------------------------------------------------------------------|---------------|---------------|---------------|---------------|
| | 1106D-E70TAG2 | 1106D-E70TAG3 | 1106D-E70TAG4 | 1106D-E70TAG5 |
| Electro unit or electropaK | ElectropaK | ElectropaK | ElectropaK | ElectropaK |
| Radiator fitted | ✓ | ✓ | ✓ | ✓ |
| Fuel filter, engine mounted | ✓ | ✓ | ✓ | ✓ |
| Water separator | ✓ | ✓ | ✓ | ✓ |
| Fuel priming pump (manual/electric) | Manual | Manual | Manual | Manual |
| Fuel cooler (not required for most installations) | ✗ | ✗ | ✗ | ✗ |
| Air filter, engine mounted | ✓ | ✓ | ✓ | ✓ |
| Engine ECM, engine mounted | ✓ | ✓ | ✓ | ✓ |
| Wiring harness to ECM | ✓ | ✓ | ✓ | ✓ |
| Wiring harness (all connectors to single customer interface) | ✗ | ✗ | ✗ | ✗ |
| Starter motor | ✓ | ✓ | ✓ | ✓ |
| Battery charging alternator | ✓ | ✓ | ✓ | ✓ |
| Flywheel housing | ✓ | ✓ | ✓ | ✓ |
| Flywheel | ✓ | ✓ | ✓ | ✓ |
| Fan | ✓ | ✓ | ✓ | ✓ |
| Fan guard | ✓ | ✓ | ✓ | ✓ |
| Temperature and oil pressure for automatic stop/alarm configurable | ✓ | ✓ | ✓ | ✓ |

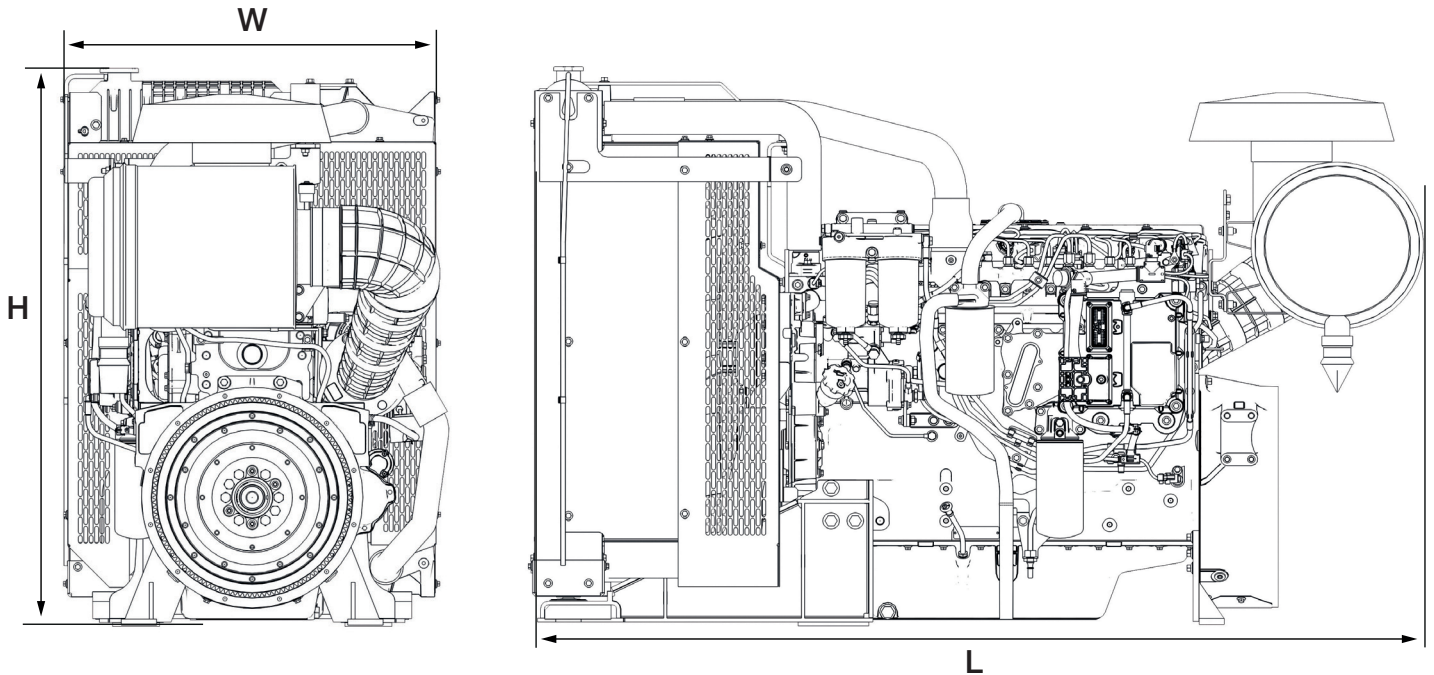
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Engine package weights and dimensions



| | Model | | | |
|--------------------------------|--------------------------------------|---------------|---------------|---------------|
| | 1106D-E70TAG2 | 1106D-E70TAG3 | 1106D-E70TAG4 | 1106D-E70TAG5 |
| Configuration | ElectropaK | | | |
| Dimensions, H x L x W, mm (in) | 1142 x 1763 x 768 (45 x 69.4 x 30.2) | | | |
| Dry weight, kg (lb) | 788 (1738) | | | |

Prime power: Power available at variable load in lieu of a main power network. Overload of 10% is permitted for 1 hour in every 12 hours of operation.

Standby (maximum): Power available at variable load in the event of a main power network failure. No overload is permitted.

1106D-E70TAG2

1100

135 kWm (Gross) @ 1500 rpm

155 kWm (Gross) @ 1800 rpm

Electropak

Basic technical data

| | |
|------------------------------|-----------------------------------------|
| Number of cylinders | 6 |
| Cylinder arrangement | Inline |
| Cycle | 4 stroke |
| Induction system | Turbocharged and air charge cooled |
| Combustion system | Direct injection diesel |
| Compression ratio | 16.8 : 1 |
| Bore | 105 mm |
| Stroke | 135 mm |
| Cubic capacity | 7.01 litres |
| Direction of rotation | Anticlockwise when viewed from flywheel |
| Firing order | 1, 5, 3, 6, 2, 4 |
| Estimated total weight (dry) | 788 kg |
| Estimated total weight (wet) | 822 kg |

Overall dimensions (Electropak)

| | |
|-----------------------------|---------|
| Height | 1087 mm |
| Length (air cleaner fitted) | 1706 mm |
| Width | 773 mm |

Moments of inertia

| | |
|------------------------------|------------------------------|
| Engine rotational components | 0.27 kgm ² |
| Flywheel | 1.26 (SAE2) kgm ² |

General installation

| General Installation | Units | 50 Hz (1500 rpm) | | 60 Hz (1800 rpm) | |
|--------------------------------------------------------------------|---------------------|------------------|---------|------------------|---------|
| | | Prime | Standby | Prime | Standby |
| Gross engine power | kW | 135.9 | 149.7 | 155.6 | 171 |
| Brake mean effective pressure | kPa | 1549.7 | 1707.9 | 1478.1 | 1626.2 |
| Mean piston speed | m/s | 6.7 | | 8.1 | |
| Electropak nett engine power | kW | 129.0 | 142.9 | 145.4 | 161 |
| Engine coolant flow (against 35 kPa restriction) | litres/min | 142 | | 170 | |
| Combustion air flow (at STP) | m ³ /min | 10.6 | 11.0 | 13.9 | 14.4 |
| Exhaust gas flow (maximum) | m ³ /min | 24.00 | 25.00 | 28.77 | 29.93 |
| Exhaust gas temperature (maximum) in manifold (after turbocharger) | °C | 513 | | 450 | |
| Nett engine thermal efficiency | % | 36.6 | 37.4 | 38.9 | 39.4 |
| Typical genset electrical output (0.8pf 25°C) | kWe | 114 | 126 | 135 | 143 |
| | kVA | 142 | 157 | 169 | 178 |
| Regenerative power (estimated) | kW | 11.5 | | 13.2 | |
| Assumed alternator efficiency | % | 91 | 91 | 91 | 92 |
| Energy balance | | | | | |
| Heat in fuel | kW | 352.4 | 381.5 | 400.1 | 434.7 |
| Power to cooling fan | kW | 4 | 4 | 7 | 7 |
| Power to coolant and lubricating oil | kW | 64.0 | 72.5 | 69 | 74.9 |
| Power to residual losses (alternator) | kW | 2.8 | 2.8 | 3.1 | 3.1 |
| Power to exhaust | kW | 107.5 | 114.1 | 119.5 | 128.3 |
| Energy to charge coolers | kW | 19.4 | 21.2 | 29.7 | 32.5 |
| Power to radiation | kW | 24.0 | 25.4 | 26.3 | 27.9 |

Prime power: Unlimited hours usage with an average load factor of 80% of the published prime power over each 24 hour period. A 10% overload is available for 1 hour in every 12 hours operation.

Standby power: Limited to 500 hours annual usage, with an average load factor of 80% of the published standby power rating over each 24 hour period. Up to 300 hours of annual usage may be run continuously. No overload is permitted on standby power.

Centre of gravity, Electropak

| | |
|-----------------------------------------------|--------|
| Forward from rear of block (wet) | 476 mm |
| Above crankshaft centre line (wet) | 176 mm |
| Offset to RHS of crankshaft centre line (wet) | -16 mm |

Performance

| | |
|--------------------------------------|---------|
| Speed variation at constant load | ± 0.18% |
| Cyclic irregularity at standby power | 0.003 |
| All ratings within | ± 3% |

Note: All data based on operation to ISO 3046-1:2002 standard reference conditions.

Sound level

Average sound pressure level for standby power @ 1 m... TBC

Test conditions

| | |
|----------------------------------------|-------------------|
| Air temperature | 25°C |
| Barometric pressure | 100 kPa |
| Relative humidity | 44% |
| Air inlet restriction at maximum power | - 5 kPa (maximum) |
| Exhaust back pressure at maximum power | 15 kPa (maximum) |
| Fuel temperature | 40°C |

If the engine is to operate in ambient conditions other than those of the test conditions, suitable adjustments must be made for these changes. For full details, contact Perkins Technical Service Department.

Cooling system

Cooling pack

| | |
|----------------------------|-------------------------|
| Overall weight (wet) | 45 kg |
| Overall face area | 469,200 mm ² |
| Width | 684 mm |
| Height | 690 mm |

Radiator

| | |
|--------------------------------------|-------------------------------|
| Face area | 303,600 mm ² |
| Number of rows and materials | 4 rows, Aluminium |
| Matrix density and material | 11.3 fins per inch, Aluminium |
| Width of matrix | 440 mm |
| Height of matrix | 690 mm |
| Pressure cap setting (minimum) | 110 kPa |

Charge cooler

| | |
|------------------------------------|-----------------------------|
| Face area | 151,800 mm ² |
| Number of rows and materials | 2 rows, Aluminium |
| Matrix density and material | 10 fins per inch, Aluminium |
| Width of matrix | 220 mm |
| Height of matrix | 690 mm |

Fan

| | |
|---------------------------|-------------------------|
| Diameter | 635 mm |
| Drive ratio | 1.25:1 |
| Number of blades | 7 |
| Material | Nylon |
| Type | Pusher |
| Air flow @ 1800 rpm | 282 m ³ /min |
| Power @ 1800 rpm | 8 kW |

Coolant

| | |
|-----------------------------------------------------------------|------------------------------------------------------|
| Total system capacity | 20.5 litres |
| System drawdown capacity | 10% |
| Engine capacity | 9.5 litres |
| Maximum top tank temperature | 108°C |
| Temperature rise across engine (maximum rating dependent) | 12°C |
| Maximum permissible external system resistance | 35 kPa |
| Thermostat operation range | 82°C to 95°C |
| Shutdown switch setting | 114°C |
| Coolant pump method of drive | Gear |
| Recommended coolant immersion heater rating (minimum) | 0.75 kW |
| Recommended coolant | BS6580 - 1992, ASTM D3306 and ELC coolants to 1E1966 |

Duct allowance

Maximum additional restriction (duct allowance to cooling airflow and resultant minimum air flow) - Standby power

| Description | rpm | kPa | m ³ /min |
|-----------------------------------------------|------|-------|---------------------|
| Duct allowance with inhibited coolant at 53°C | | | |
| Minimum air flow | 1500 | 0.125 | 204 |
| | 1800 | 0.12 | 258 |
| Duct allowance with inhibited coolant at 46°C | | | |
| Minimum air flow | 1500 | 0.200 | 184 |
| | 1800 | 0.200 | 228 |

Electrical system

| | |
|-------------------------------------------------------------------------------|-------------------------------------------------|
| Alternator | 8SI |
| Alternator voltage | 12 volts |
| Alternator output | 65 amps |
| Starter | AZF |
| Starter motor voltage | 12 volts |
| Starter motor power | 4.0 kW |
| Number of teeth on the flywheel | 126 |
| Pull-in current of starter motor solenoid @ 25°C maximum ⁽¹⁾ | 12 volts 68 amps |
| Hold-in current of starter motor solenoid @ 25°C maximum ⁽¹⁾ | 12 volts 20 amps |
| Engine stop method | CAN link signal or Hardwire input to engine ECM |

¹ All leads to rated at 10 amps minimum

Cold start recommendations

Minimum required cranking speed over TDC

| | 5 to -5°C | -5 to -20°C | -20 to -25°C |
|-----------------------------|-------------|-------------|--------------|
| Starter | AZF | | |
| Battery | 1 x 750 CCA | 2 x 750 CCA | 2 x 900 CCA |
| Maximum breakaway current | NA | | |
| Cranking current | 1000 A | | |
| Aids | None | Glowplugs | |
| Minimum mean cranking speed | 130 rpm | 100 rpm | 100 rpm |

Note: Battery capacity is defined by the 20 hour rate.

Note: If a change to a low viscosity oil is made, the cranking torque necessary at low ambient temperatures is much reduced. The starting equipment has been selected to take advantage of this. It is important to change to the appropriate multigrade oil in anticipation of operating in low ambient temperatures.

Exhaust system

| | |
|---------------------------------------------------|----------|
| Maximum back pressure - 1500 rpm & 1800 rpm | 15 kPa |
| Exhaust outlet, internal diameter | 115.9 mm |

Fuel system

Injection components

Injector Electronic CRIN2
 Fuel pump.....CB28

Fuel priming

Priming pump type Manual
 Maximum priming time.180 seconds

Fuel feed

Maximum fuel flow6.6 litres/min
 Maximum suction head at engine fuel pump inlet.....-17 kPa
 Maximum static pressure head 10 kPa
 Fuel temperature at engine fuel pump inlet..... 75°C
 Tolerance on fuel consumption ± 5%

Fuel specification

Fuel standard. Various (contact Perkins Technical Department)

Fuel consumption

| Load | Type of operation and application | | | |
|------------------|-----------------------------------|-----------|----------|-----------|
| | 1500 rpm | | 1800 rpm | |
| | g/kWh | litres/hr | g/kWh | litres/hr |
| 110% Prime power | 212.6 | 38.0 | 212.1 | 43.1 |
| 100% Prime power | 216.5 | 35.1 | 214.6 | 39.7 |
| 75% Prime power | 229.6 | 27.9 | 231.4 | 32.1 |
| 50% Prime power | 234.1 | 19.0 | 240.3 | 22.2 |
| 25% Prime power | 249.6 | 10.2 | 263.9 | 12.2 |

Induction system

Maximum air intake restriction

Clean filter4 kPa
 Dirty filter.....8 kPa
 Air filter type.....Paper element

Lubrication system

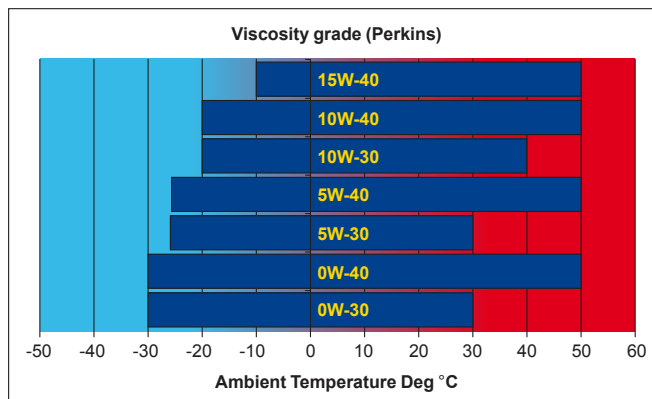
Maximum total system oil capacity 17.5 litres
 Minimum oil capacity in sump 12.5 litres
 Maximum oil capacity in sump 15.5 litres
 Maximum engine operating angles -
 Front up, front down, right side, left side..... 7°
 Sump drain plug tapping size.3/4 - 16 UNF
 Shutdown switch setting (where fitted)
 Oil pressure shut down switch 90 kPa Falling

Lubricating oil

Relief valve opening pressure430 kPa
 Pressure at maximum speed340 kPa
 Maximum continuous oil temperature (in rail).....125°C
 Oil consumption at full load (% of fuel) < 0.1

Recommended SAE viscosity

A multigrade oil must be used which conforms to API CH4 or CI4
 ACEA E5 must be used, see illustration below:



Mountings

Maximum static bending moment at rear face of block.....1130 Nm
 Maximum permissible overhung load
 on the flywheel..... Calculated on request
 Maximum bending moment at rear of flywheel housing.....
 ± 3000 in Shock Nm

Load acceptance

The data below complies with the requirements of classification 3 and 4
 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5.

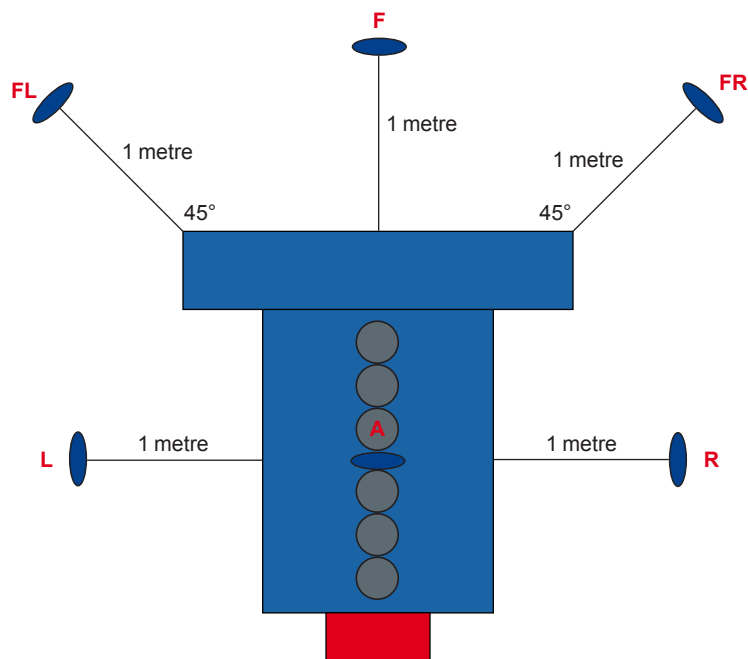
Initial load application: When engine reaches rated speed
 (15 seconds maximum after engine starts to crank).

| Description | Units | 1500 rpm | 1800 rpm |
|-------------------------------|---------|----------|----------|
| % of prime power | % | 95.0 | 93.5 |
| Load | kWe | 120.0 | 121.5 |
| Transient frequency deviation | % | 18.9 | 9.5 |
| Frequency recovery time | Seconds | 1.6 | 0.9 |

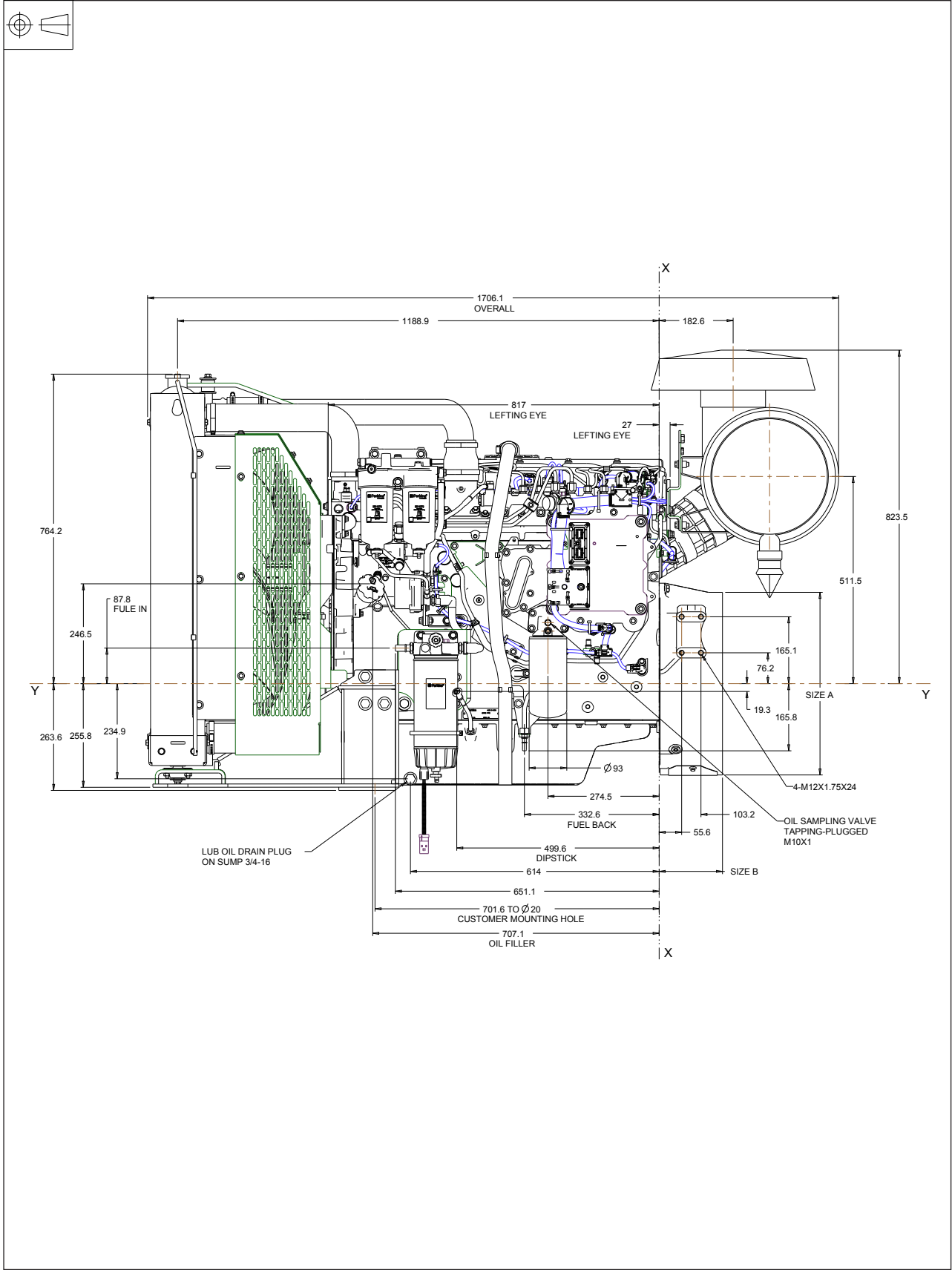
Noise data

Noise levels (predicted)

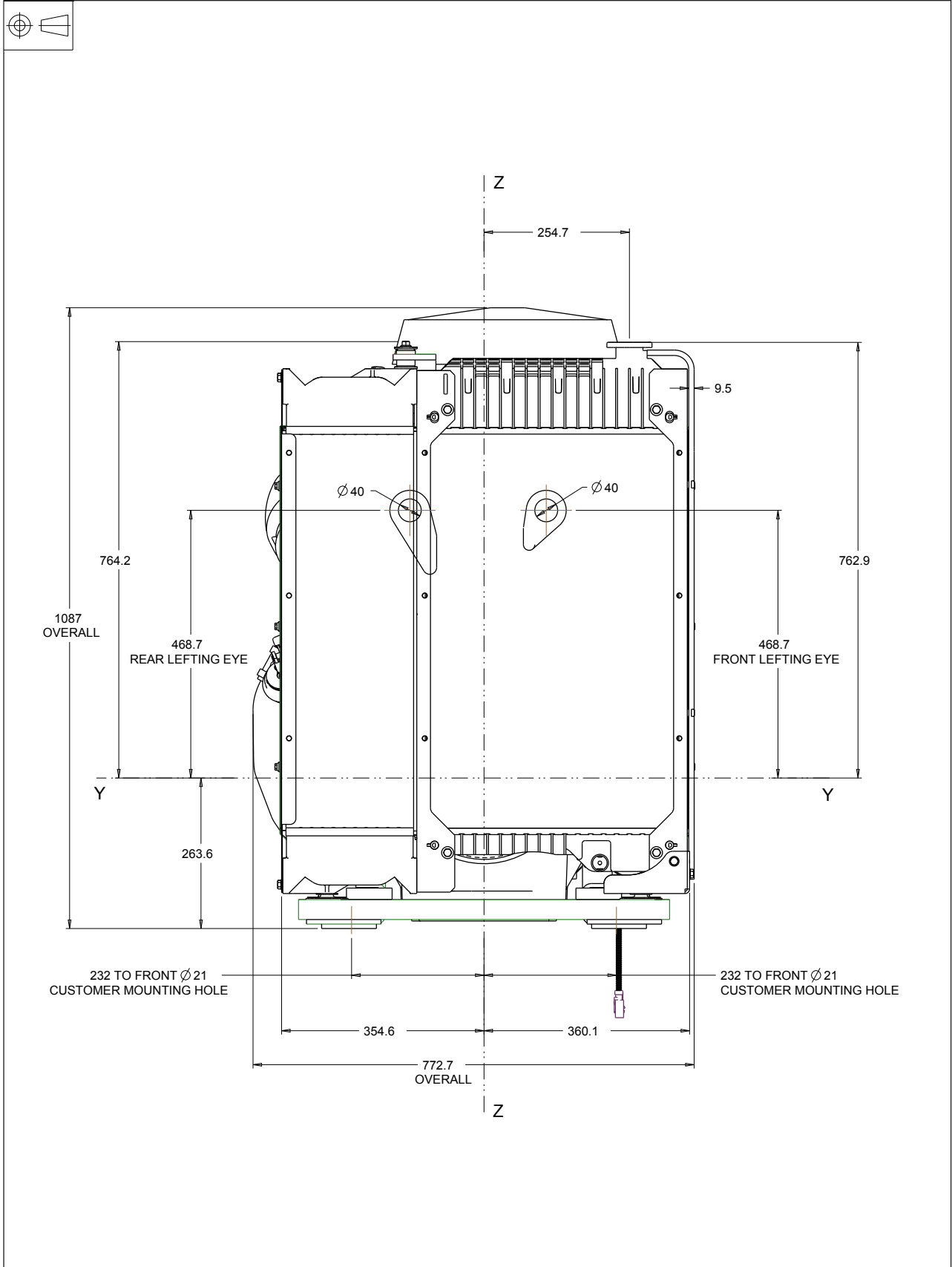
| Prime power noise level dB(A) | | |
|-------------------------------|-------|-------|
| Position | 50 Hz | 60 Hz |
| F | 95.6 | 99.8 |
| R | 95.6 | 99.3 |
| L | 95.4 | 99.0 |
| A | 92.9 | 96.2 |
| FR | 94.7 | 98.9 |
| FL | 94.9 | 98.9 |



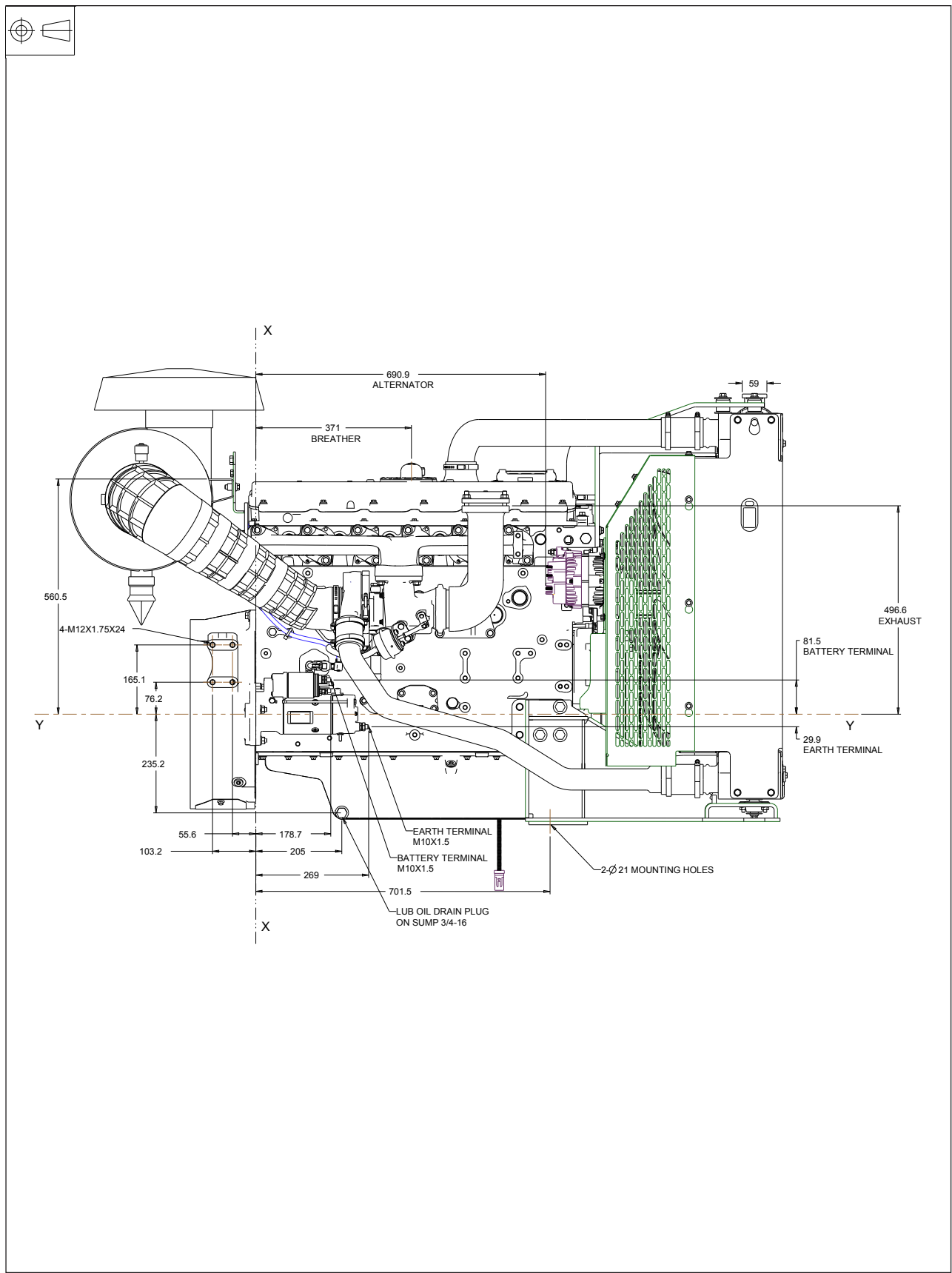
1106D-E70TAG2 - Left side view



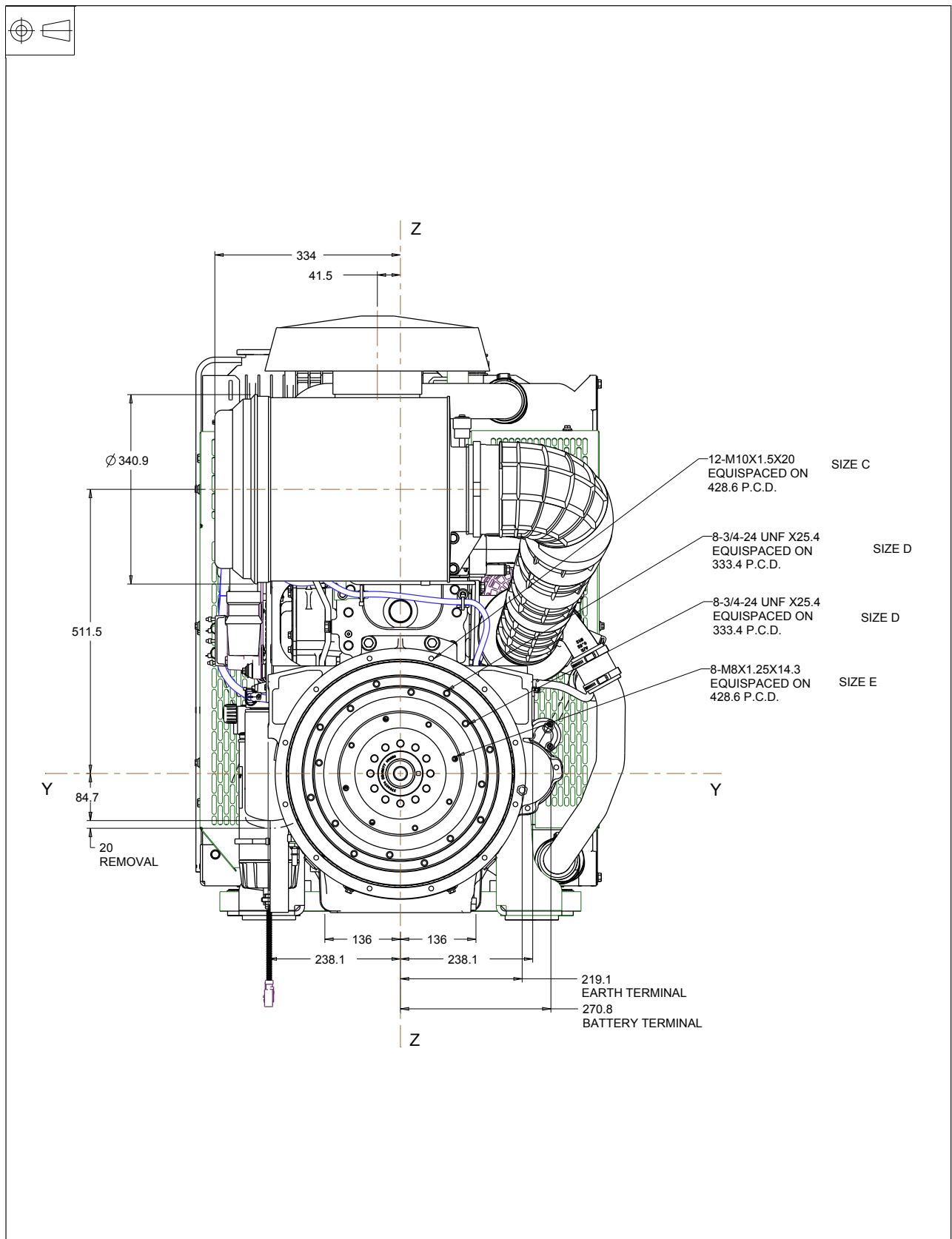
1106D-E70TAG2 - Front view



1106D-E70TAG2 - Right side view



1106D-E70TAG2 - Rear view



1106D-E70TAG2 - Plan view

